



# P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Seventh Semester, B.E. - Semester End Examination; February - 2022

Graph Theory, Number Theory and Analysis

Time: 3 hrs

Max. Marks: 100

**Note:** I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
<b>I : PART - A</b>		<b>10</b>			
I a.	If 0.7143 is an approximate value of $\frac{5}{7}$ then find $E_a$ .	2	L1	CO1	PO1
b.	State Division algorithms.	2	L1	CO2	PO1
c.	State Wilson's theorem.	2	L1	CO3	PO1
d.	Define sub-graph with example.	2	L1	CO4	PO1
e.	Define colouring of a graph. Give an example.	2	L1	CO5	PO1
<b>II : PART - B</b>		<b>90</b>			
<b>UNIT - I</b>		<b>18</b>			
1 a.	Find the real root of the equation $x^3 - 4x - 9 = 0$ correct to three decimal places by using secant method.	9	L2	CO1	PO1
b.	Use the Birge-Vieta method to find a real root correct to three decimals of the equations $x^3 - 11x^2 + 32x - 22 = 0$ , $p = 0.5$ . Find the deflated polynomial in each case.	9	L2	CO1	PO1
c.	Apply the Graeffe's root squaring method to find the real roots of the equation, $x^3 - 2x + 2 = 0$ .	9	L3	CO1	PO2
<b>UNIT - II</b>		<b>18</b>			
2 a.	i) Prove that square of any integer is of the form $4k$ or $4k + 1$ .				
	ii) Show that $\frac{n(n+1)(2n+1)}{6}$ is an integer, $n \geq 1$ .	9	L3	CO2	PO2
b.	Find the $gcd(256, 1166)$ and express, it in the form $256x + 1166y$ where $x, y \in \mathbb{Z}$ .	9	L2	CO2	PO1
c.	i) State fundamental theorem of arithmetic.				
	ii) Solve the linear Diophantine equation, $172x + 20y = 1000$ .	9	L3	CO3	PO3
<b>UNIT - III</b>		<b>18</b>			
3 a.	Solve the linear congruence $18x \equiv 30 \pmod{42}$ .	9	L2	CO3	PO2
b.	Solve by using Chinese Remainder theorem, $x \equiv 5 \pmod{11}$ , $x \equiv 14 \pmod{29}$ , $x \equiv 15 \pmod{31}$ .	9	L3	CO3	PO3
c.	Verify Wilson's theorem when $p = 13$ .	9	L2	CO3	PO2

UNIT - IV

18

4 a. Define isomorphisms of graphs. Show that the following two graph are isomorphic:

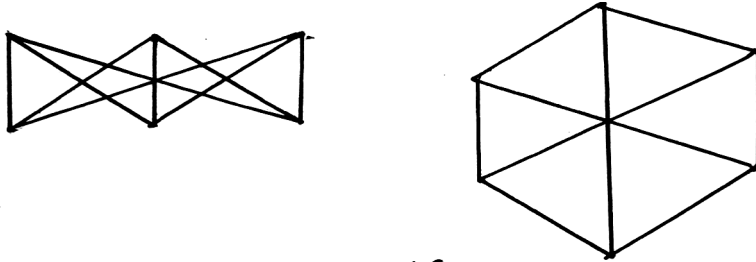


Fig 40

9 L2 CO4 PO1

b. Define induced sub-graph, spanning sub-graph with example.

9 L2 CO4 PO1

c. i) Determine the adjacency matrix and incidence matrix of  $K_4$ .

9 L3 CO4 PO3

ii) Find the energy of  $K_{1,3}$ .

UNIT - V

18

5 a. Define chromatic number. Find the chromatic polynomial for the cycle of length 4 ( $C_4$ ). Find the chromatic number also.

9 L2 CO5 PO2

b. Schedule a time table for four teachers and five subjects, given the data:

Periods P	N <sub>1</sub>	N <sub>2</sub>	N <sub>3</sub>	N <sub>4</sub>	N <sub>5</sub>
T <sub>1</sub>	2	0	1	1	0
T <sub>2</sub>	0	1	0	1	0
T <sub>3</sub>	0	1	1	1	0
T <sub>4</sub>	0	0	0	1	1

9 L3 CO5 PO2

c. Explain dominating set and domination number of a graph with an example.

9 L2 CO5 PO2

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